



Predicting weekly variation of *Culex tarsalis* (Diptera: Culicidae) West Nile virus infection in a newly endemic region, the Canadian prairies

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Abstract:

West Nile virus (WNV) spread across most of North America within a short time period after its incursion into the Western Hemisphere. The Canadian prairies had the highest human incidence of WNV disease in Canada, particularly in 2007. Statistical modeling and geographic information systems can be used to develop a predictive model and facilitate the mobilization of targeted disease management strategies. Using data collected between 2005 and 2008, we constructed models integrating abiotic and biotic factors to predict the WNV infection rate in female *Culex tarsalis* Coquillett, the primary vector of WNV in the Canadian prairies. During the study period, the highest mean *Cx. tarsalis* infection rate was during week 34 (late August). The *Cx. tarsalis* infection rate increased with increasing *Cx. tarsalis* abundance and mean temperature lagged from 1 to 8 wk, but decreased with increasing mean precipitation lagged from 2 to 6 wk. Furthermore, precipitation was a 'distorter variable' that altered the association between *Cx. tarsalis* abundance and the WNV infection rate. Our model clarified how weather influenced the *Cx. tarsalis* infection rate in the Canadian prairies, a newly and highly WNV endemic region of North America. An understanding of the role of lagged weather variables was essential for providing sufficient lead time to predict WNV occurrence, and for implementing disease control and prevention strategies. Furthermore, it is a useful tool for assessing the potential effects of future climate change on WNV in areas near its northern distributional limit.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: variations in temperature/precipitation

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Temperature: Fluctuations



Climate Change and Human Health Literature Portal

Geographic Feature:

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : prairie

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: West Nile Virus

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Short-Term (

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content